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Dated: May 19, 2005 Signature: *Reza Kalaaghabadi*  
(Attorney-in-Fact)

Docket No.: 102323-0130  
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:  
Jonathan E. Greene

Application No.: 10/643,164

Confirmation No.: 3585

Filed: August 18, 2003

Art Unit: 2124

For: METHODS AND APPARATUS FOR FAST  
FOURIER TRANSFORMS

Examiner: C. C. Do

DECLARATION OF JONATHAN E. GREENE

I, Jonathan E. Greene, a resident of Great Barrington, Massachusetts, declare and state as follows:

1. I am the inventor of the above-referenced U.S. Patent Application (the Application).
2. The Application generally is directed to methods of performing Fast Fourier transforms and more specifically, by way of non-limiting example, to methods of performing Fast Fourier transforms with bit reversal performed within a final stage of butterfly calculations.
3. I understand that the Examiner Do has requested this affidavit to establish, for the record, that the currently pending claims are supported by U.S. Provisional Application No. 60/168,027 (the Provisional Application), filed November 30, 1999. A copy of that application is attached as Exhibit I hereto.
4. The currently pending claims are reprinted in the table below and, specifically, are

reprinted in the left-hand column. The right-hand columns show the start page/line and end page/line for exemplary passages in the Provisional Application that support the claims.

Claims Support Table

Claim	Corresponding text from Provisional Application	
	Start Page	Line Beginning ...
	End Page	Line Ending ...
47. A system for performing a fast Fourier transform on N ordered inputs in n stages comprising:	13	while (bflycnt) {
	29	/* end butterfly loop */
a non-final stage calculating means for repetitively performing in-place butterfly calculations for n-1 stages;	13	wp0 = SETUP->twidp;
	22	/*end penultimate pass */
a final stage calculating means for performing a final stage of butterfly calculations including:	22	Cr1 = (float *)((char *)Cr + N);
	29	/* end butterfly loop */
a first loop means for performing a portion of the final stage butterfly calculations, the first loop means performing the set of butterfly calculations, and storing butterfly calculation outputs in shuffled order in place of the selected inputs to result in a correct ordering of transform outputs; and	22	while ( scnt ) {
	26	/* end butterfly loop */
a second loop means for performing a remaining portion of the final stage butterfly calculations, the second loop means performing two sets of butterfly calculations, and storing butterfly calculation outputs from a first one of the two sets of butterfly calculations in shuffled order in place of the inputs selected for a second one of the two sets of butterfly calculations and storing butterfly calculation outputs from the second one of the two sets of butterfly calculations in shuffled order in place of the inputs selected for the first one of the two sets of butterfly calculations to result in a correct ordering of transform outputs.	26	bflycnt = index >> 4;
	29	/*end butterfly loop */
48. The system of claim 47, wherein the final stage calculating means performs all butterfly calculations as radix-4 butterflies having four inputs and four outputs.	22	Cr1 = (float *)((char *)Cr + N);
	29	/* end butterfly loop */
49. The system of claim 48, wherein N is a power of two.	13	N = 1 << LOG2N
	13	N = 1 << LOG2N
50. The system of claim 49, wherein the non-final stage calculating means performs a first stage of radix-8 butterfly calculations followed by n-2 stages of radix-4 butterfly calculations.	13	if ( LOG2N & 1 ) {
	15	/* end radix-8 first pass */
51. The system of claim 48, wherein the non-final and final stage calculating means include a four-fold SIMD processor for performing four radix-4 butterfly calculations at a time.	15	else {
	29	/* end butterfly loop */

52.	A method for performing a fast Fourier transform on N ordered inputs in n stages comprising:	13	while (bflycnt) {
		29	/* end butterfly loop */
	performing non-final stage calculations by repetitively performing in-place butterfly calculations for n-1 stages;	13	wp0 = SETUP->twidp;
		22	/* end penultimate pass */
	performing final stage calculations by performing a final stage of butterfly calculations in a first loop for performing a portion of the final stage butterfly calculations and in a second loop for performing a remaining portion of the final stage butterfly calculations;	22	Cr1 = (float *)((char *)Cr + N);
		29	/* end butterfly loop */
	wherein each of the butterfly calculations in the first loop and the second loop includes storing butterfly calculation outputs in shuffled order in place of selected inputs to result in a correct ordering of transform outputs.	22	Cr1 = (float *)((char *)Cr + N);
		29	/* end butterfly loop */
53.	The method of claim 52, wherein the final stage butterfly calculations are all performed as radix-4 butterflies having four inputs and four outputs.	22	Cr1 = (float *)((char *)Cr + N);
		29	/* end butterfly loop */
54.	The method of claim 53, further comprising storing twiddle factors for application in the butterfly calculations in groups of four, each group having an index and the groups being stored in bit reversed order based on the index.	9	n = 1 << LOG2N
		9	SETUP->twidp = twidp;

6. As reflected in the table, above, the currently pending claims are fully supported in the Provisional Application

7. I hereby declare that all statements made herein off my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Respectfully submitted,

5/17/2005

Date

Jonathan E. Greene

Jonathan E. Greene